AMATEUR SATELLITE REPORT

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Glitch Halts AO-10 Ops As Sun Angle Sags

AMSAT OSCAR 10 was off the air for about a day on Tuesday, August 4. Observers report the transponder was off and the Engineering Beacon was spewing meaningless telemetry. The situation was corrected by Wednesday after the intervention of a command station to reset the IHU (Integrated Housekeeping Unit).

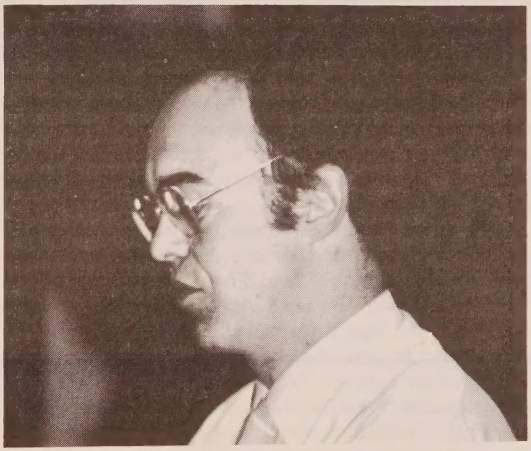
The upset of transponder operations is likely to have been caused by a random glitch in the IHU output which commanded the transponder off. The IHU has been unusable since its memory has sustained massive radiation damage. It has been exposed to space radiation and in particular, the Van Allen radiation belts.

The IHU was apparently reset on Wednesday by the command station. Initial reports indicate a favorable spacecraft configuration may have resulted. Preliminary indications suggest the satellite's high gain arrays may have been placed on-line. The omni antennas had been selected several months ago by a random arrangement of the IHU output. The selection of the high gain arrays should improve results during certain parts of the orbit.

The satellite will be available for use until approximately the end of August. The current operating schedule is Mode B, from MA 40 through 220. The schedule will remain in effect until late August or early September when the satellite must be withdrawn from use.

Beginning in early September sun angles will be too low to allow adequate amounts of solar radiation to be absorbed by AO-10's solar panels. Consequently, available power will be reduced to near-zero levels by late September. The entire satellite will then power down, the second episode in its life when complete power down has occurred. During these episodes power levels are so low that no on-board electrical systems can be sustained.

Power down is inevitable since controllers no longer are able to maneuver the satellite's attitude in orbit. This ability was afforded by the IHU energizing the magnetorquers in precise sequence and timing. Since the IHU is inoperative, the satellite's attitude stays fixed with regard to inertial space. However, since the satellite and the earth move around the sun as a system, the attitude of AO-10's solar panels with respect to the sun changes seasonally. We are now approaching the worst season for AO-10 sun angles.



Dr. Martin Sweeting, G3YJO, addresses the Colloquium at the University of Surrey, Guildford, England July 19.

On the positive side, satellite controllers are optimistic AO-10 will again be usable following the eclipses beginning in late Autumn.

AMSAT Leaders Voice Concerns As New Trend Emerges

AMSAT leaders were very much in evidence last week when a government/industry meeting was held to discuss the burgeoning interest in small satellites. The meeting, jointly sponsored by the American Institute of Aeronautics and Astronautics and the Defense Advanced Research Planning Agency was held at the Naval Postgraduate School in Monterey, California August 4 through 6.

Speaking before an audience of several hundred as part of the concluding forum, AMSAT Vice President Jan King, W3GEY, emphasized the educational aspects of OSCAR satellites and pointed out that OSCARs have traditionally been launched on a "space-available" basis. If, said King, the government allocates all future small payload slots to defense-related missions, the viability of future OSCARs is threatened. This would deprive future generations of engineers from hands-on satellite experience they now obtain by contact with OSCARs he lamented.

In his paper presented the prior day, King reviewed the history of OSCARs and pointed to numerous "firsts" achieved in the OSCAR program. The audience, largely military and industrial senior managers were spellbound as the story of small satellites unfolded before them in King's presentation.

The growing interest in small satellites derives from a growing concern in defense circles that large communication satellites, government and commercial satellites alike, are vulnerable to enemy attack. To offset this perceived vulnerability, the Defense Department is investigating the feasibility of supplementing large geosynchronous satellites with hundreds of small, low earth orbiters. These would form a huge, globe-girdling communications network and would be extremely difficult to defeat defense sources believe.

This communications mission as well as certain SDI applications has sparked keen interest in low earth orbiting "Cheapsats." The series of OSCARs leading to Fuji OSCAR 12 is almost precisely of the class of satellites now envisioned as filling the newly-defined defense mission. AMSAT's concern is that access to small launch surplus capacity and even shuttle Getaway Specials (GAS cans) will be sharply curtailed if assertions of Defense priorities are made by the government.

Nearly two dozen AMSAT members were among the industry and military officials attending. AMSAT Chairman John Browning, W6SP, and President Vern Riportella, WA2LQQ, joined with Jan King, W3GEY, to explain AMSAT's role and legacy in small satellites to a largely sympathetic and supportive attendance. Also present was Phase 4 designer Jim Eagleson, WB6JNN, and Lunar Polar Orbiter Project Leader David Eisenberg, WB2LQQ. A small display area in the hospitality room provided by Orbital Sciences Corporation held an AMSAT display. A video tape of AMSAT activities and a self-contained slide projector attracted significant attention from the professionals attending.

WA2LQQ commented he had at least one offer to launch a small payload in the 1989 time frame. The offer was made by a representative of one of the launcher companies attending. He said the launch opportunity would be suitable for a small payload in the 100 kg class, about the size of FO-12. He said AMSAT will be pursuing this offer immediately to further define what will be available and to establish the type of mission most suitable for the orbital characteristics provided. The mission of AMSAT's payload would be exclusively for Amateur Radio he said. A small PACSAT-like satellite is a distinct possibility WA2LQQ stated.

Announce Contract For New Shuttle

In a long-awaited announcement, Rockwell International was awarded a $1.3 billion contract July 31 to build a new space shuttle to replace the Challenger, officials said. If all goes well, the new shuttle, serial number OV-105, will be delivered to NASA April 30, 1991, to join the other three members of NASA's fleet, Discovery, Atlantis and Columbia. First launch of the new shuttle is to come in 1991 or 1992.

The new shuttle will be built at Rockwell's Palmdale California facility. More than 100 sub-contractors will be involved. The basic design will be along the lines of Atlantis and Discovery but incorporating improvements including state-of-the-art computers and hydraulic systems said a senior Rockwell official.

Meanwhile, NASA has announced it will sponsor a contest to name the new orbiter. School kids will be asked to suggest the name for the new orbiter in honor of schoolteacher Christa MacAuliff who perished along with six other crew members in the 1986 Challenger disaster.

Soviets Launch Huge Earth Resources Platform

The Soviet Union has launched a 15 to 20 ton earth resources and ocean survey platform. It is the largest civilian survey spacecraft ever launched. Described as being the size of a school bus, the platform was orbited by a Proton booster on July 25 into an initial 175 by 105 mile orbit. This was later circularized to 147 by 154 miles. The object has been designated COSMOS 1870, object 87-064A, catalog 18225.

The launch of the huge platform added further emphasis to the apparently growing gap between Soviet space achievements and those of the Western nations. Representative Bill Nelson, (D.-FL), Chairman of the House space science and application subcommittee said: "The launch of the Soviet observation platform is one more example of the Soviets' steady commitment to space, while our own progress has suffered numerous setbacks."

The spacecraft was launched from the Baikonur Cosmodrome at Tyuratam at about 0855 UTC July 25. Because of its very large size it should be an easy naked-eye object in the pre-dawn/post-dusk skies. The initial element set for COSMOS 1870 is given as follows:

Epoch	87214.85702392
Element Set	24
Inclination	71.9329 deg
RAAN	99.1022 deg
Eccentricity	0.00114670
Arg of Perigee	260.9267 deg
Mean Anomaly	99.0415 deg
Mean Motion	16.08648753 rev/day
Drag	0.00061798 rev/day^2
Rev #	137
SMA	6628.6 km
Period	89.52 min
Apogee	258.09 km
Perigee	242.89 km

Call For Papers

Organizers of the Fifth AMSAT Space Symposium are planning a two-track technical program for the November 6-8, 1987 meeting. The meeting will be held in Southfield Michigan, a suburb of Detroit, in conjunction with the AMSAT Annual Meeting.

The primary technical program will cover topics of interest to Amateur Satellite users, both novice and veteran: reports on satellites in service, updates on projects under construc-

Junior DeCastro, PY2BJO, BRAMSAT President at a Surrey Colloquium breakfast.

tion, and something to stretch the imagination for the future. The concurrent second session will provide an introduction to Amateur Radio and to the educational uses of both Amateur and non-amateur satellites to an audience of educators and students who, for the most part, are not yet Radio Amateurs.

The organizers issued a call for papers in the following areas:

Primary track program:

A. AMSAT OSCAR 10
1. Condition report
2. How sun angles and attitude are estimated without benefit of telemetry

B. UoSAT OSCARs 9/11
1. Report on DCE experiment
2. Follow-on missions

C. Fuji OSCAR 12
1. OBC software evolution and features
2. Mailbox operation
3. Power budget

D. Phase 3C
1. Progress report
2. Expected ground station requirements for various transponders
3. RUDAK
   a) Hardware requirements
   b) Hardware availability
   c) Operating practices
4. Techno-sports

E. Phase 4
1. Technical
   a) Propulsion
   b) Station keeping
   c) Antennas
   d) Transponders
   e) Thermal design
   f) Ground station requirements
      1) Individual users
      2) Gateways
2. Operation
   a) Organization of ground networks/gateways
   b) Disaster/public service applications
3. Funding
4. Launch opportunities

F. RS satellites
1. Observations and impressions of RS-10/11
2. Robot operation
3. Telemetry

G. New Technology
1. Applications of Digital Signal Processing to Amateur Satellites and Amateur Radio in general
2. ACSSB
3. New software for satellite applications

H. Manned spaceflight operation
1. Shuttle
2. Space Station

Alternate track program:

A. Classroom applications of satellites
1. Direct use
   a) Visual observations
   b) Radio observations
   c) Predicting orbits
   d) Monitoring and interpreting telemetry
   e) Techno-Sport participation
   f) Listening to manned missions
   g) Weather satellites
2. Indirect use
   a) Satellite applications for programming projects
      1) Orbit prediction software
      2) Real-time telemetry reception
      3) Conversion of raw telemetry to engineering units
      4) Techno-Sport software
   b) Satellite applications for hardware projects
      1) Receivers/converters
      2) Antenna tracking systems
      3) Antennas
      4) Modems
   c) Teaching physics with satellites
   d) Non-science satellite topics

B. School-sponsored Get Away Special projects

C. EDSAT Project
1. Mission objectives
2. Spacecraft hardware
3. Classroom hardware requirements

D. NUSAT Project
1. Hands-on aerospace curriculum

Please submit abstracts of papers by September 5, 1987 to AMSAT, PO Box 1091, Ann Arbor, MI 48106-1091. For more information, call Larry Koziel K8MU at (313) 477-3900 days.

Ron Broadbent, G3AAJ, AMSAT UK Secretary, holds forth at the AMSAT UK Colloquium, 18 July.

JARL Provides FO-12 Operating Schedule

From		To		
Date	Time	Date	Time	Mode
August 25	05:50	26	04:55	JA
27	06:03	28	05:10	JA
29	06:16	31	04:28	JA
September 02	02:41	03	03:48	JD
04	02:54	05	04:01	JD
06	03:07	07	02:13	JD
09	02:27	10	03:35	JD

The transponders will be off at others times.

Short Bursts

• The new Amateur Radio video, "The New World of Amateur Radio" will debut with a commercial satellite broadcast on Sunday, September 20 at 2200 UTC. The broadcast will be on SPACENET 1, transponder 12H, channel 23. SPACENET 1 is positioned at 120 degrees West. The "New World of Amateur Radio" was produced for ARRL by a team led by Roy Neal, K6DUE. Roy says the video features emphasis on Amateur Space activities and packet radio as waves of the future.

• *AMSAT's Technical Journal* is being mailed to members who subscribed early. This important, historic journal contains detailed technical papers by distinguished experts from around the world. The remaining copies will be available on a first-come basis. Cost is $10 plus $2 shipping to domestic subscribers. Call or write AMSAT for further information.

• John Swancara, WA6LOD, says he was among the ATS-3 team at the Goddard Space Flight Center in 1967 when the veteran geosynchronous spacecraft was launched. John continues with Hughes and is a Systems Engineer vitally involved with their commercial satellite program. He's been in charge of on-orbit check out of many recent satellites including all the Westar and Palapa satellites. AMSAT is preparing experiments to propose to NASA to model Phase 4 techniques using ATS-3. Ralph Wallio, WØRPK, has been appointed AMSAT ATS-3 Experiments Manager.

• Arianespace has announced that September 11 is launch day for its long-delayed V-19 mission. The Ariane program has been on hold since May, 1986. The resumption of Ariane launches with V-19 sets the stage for AMSAT's Phase 3C to be launched early next year, perhaps March.

• The Central States VHF Society has awarded its coveted Chambers Award for technical achievement to AMSAT member Leroy May, W5HN. The Central States VHF Society continues to be a strong supporter of the Amateur Satellite Program as demonstrated by its regular annual contributions and the fact it has presented its prestigious Chambers Award for technical achievement to several prominent AMSAT members including W3GEY and WØPN.

• The rare TA1D (Turkey) has been active on RS-10/11.

• The TAPR FO-12 modems are now being shipped according to several who have recently received their units.

• Good sub-horizon propagation is being reported on RS-10/11 especially when the bird is over the polar regions. So don't wait for above horizon elevations to look for AOS.

• RS-5 and 7 are still operational although they may not be switched on on every orbit. The command team that usually handles that chore has been fully occupied with the RS-10/11 activities recently.

• Membership recruitment, renewals and Life Member renewals are up. If you haven't already done so, it's time for you to get in on the member recruitment contest. And while you're at it, you become eligible for a complete autotracking system when you renew. Call or write AMSAT HQ for information. AMSAT, P.O. Box 27, Washington, D.C. 20044 or call 301-589-6062.

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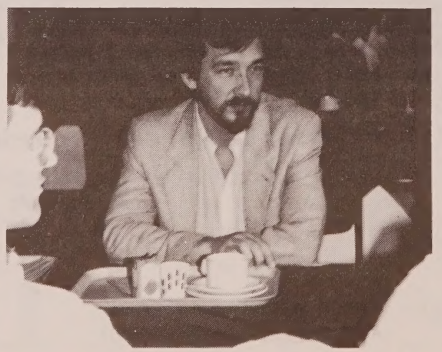

Nico Janssen, PAØDLO, at breakfast at Surrey, July 19.

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